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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/808,016	03/15/2001	Kazuo Maeda		4596

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GEORGE A. LOUD
3137 MOUNT VERNON AVENUE
ALEXANDRIA, VA 22305

EXAMINER	
KILDAY, LISA A	

ART UNIT	PAPER NUMBER
2829	

DATE MAILED: 04/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/808,016	MAEDA ET AL.
	Examiner	Art Unit
	Lisa A Kilday	2829

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Drawings

The drawings are objected to because fig. 7B and 13A depict H2O2 and H2O as "hydrogen peroxide water". Applicant must disclose if it is Hydrogen peroxide and water or aqueous hydrogen peroxide. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

While applicant may be his or her own lexicographer, a term in a claim may not be given a meaning repugnant to the usual meaning of that term. See *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947). The term "hydrogen peroxide water" in claim 7 is used by the claim to mean "hydrogen peroxide and water," while the accepted meaning is "aqueous hydrogen peroxide."

The term "heat-insulating" in claim 11 is a relative term which renders the claim indefinite. The term "heat-insulating" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The examiner does not know the meaning of insulating the mixed solution. The term "heat-insulating"

should be replaced by heating or another suitable word that describes what claim 11 intends.

The term "derivative" in claims 1 & 6 is a relative term which renders the claim indefinite. The term "derivative" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Chemical reactivity is a most unpredictable and empirical art and it is well settled that the requirement that the claims be commensurate in scope with the enabling disclosure is particularly stringent in this area of technology. In re Doumani 126 USPQ 408, In re Grant 134 USPQ 248, In re Fisher 166 USPQ 18, Mobil Oil Corporation v. W. R. Grace and Company 180 USPQ 418, In re Slocombe 184 USPQ 740, In re Mercier 185 USPQ 774, Corona Cord Tire Company v. Dovan Chemical Corporation 192 CD 255, See In re Hawkins 174 USPQ 157 (pg. 163) reasoning is sufficient, evidence is not required.

Claim Objections

A series of singular dependent claims is permissible in which a dependent claim refers to a preceding claim which, in turn, refers to another preceding claim.

A claim which depends from a dependent claim should not be separated by any claim which does not also depend from said dependent claim. It should be kept in mind that a dependent claim may refer to any preceding independent claim. In general, applicant's sequence will not be changed. See MPEP § 608.01(n).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6, 8-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Kohei (JP 05-343394). Kohei discloses a film-forming surface reforming method comprising: bringing a gas or an aqueous solution containing ammonia into contact with a film forming surface before an insulating film is formed on the film forming surface of a substrate and bringing a gas or an aqueous solution containing hydrogen peroxide (H2O2) (abstract, ¶¶ 24, 26).

In re claim 2, Kohei discloses wherein any one of a silicon oxide and silicon nitride (SiN) is exposed to the film-forming surface (abstract).

In re claim 3, Kohei discloses that any one of a semiconductor and a metal layer in addition to any one of the silicon oxide film and the silicon nitride is exposed on the film-forming surface (abstract).

In re claim 4, Kohei discloses that the amine, NH3, has a chemical formula NRnH (3-n) (abstract).

In re claim 6, Kohei discloses a film-forming surface reforming method comprising: bringing a gas or an aqueous solution containing ammonia into contact with a film forming surface before an insulating film is formed on the film forming surface of a substrate and reforming the film forming surface by brining a gas or an aqueous

solution containing hydrogen peroxide (H2O2), forming an insulating film on the reformed film forming surface (abstract, ¶¶ 24, 26).

In re claim 8, Kohei discloses exposing a film-forming surface of a silicon oxide film to an aqueous solution containing any one of NO_2^- and NO_3^- and forming an insulating film on the film-forming surface after the film forming surface is exposed to the aqueous solution (abstract, ¶¶ 24, 26, 30-32).

In re claim 9, Kohei discloses a mixed solution containing NH3, H2O2, and H20 as the aqueous solution (abstract, ¶ 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5, 7, 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kohei as applied to claims 1-4, 6, 8-9 above, and further in view of Ikakura et al. (EP 1-058-301 A1).

Kohei discloses a film-forming surface reforming method comprising: bringing a gas or an aqueous solution containing ammonia into contact with a film forming surface before an insulating film is formed on the film forming surface of a substrate and bringing a gas or an aqueous solution containing hydrogen peroxide (H2O2) (abstract, ¶¶ 24, 26). Kohei discloses forming a silicon containing insulating film (abstract). However in re claims 12-15, Kohei does not teach using CVD by reacting ozone

containing gas (O3) and TEOS to form this insulating layer. Ikakura et al. teaches that it is well known in the art to form SiO2 by CVD using O3 and TEOS (fig. 3c, abstract, ¶¶ 1-11). It would be obvious to one skilled in the art to modify the film forming surface of a substrate followed by the formation of an insulating layer as taught by Kohei, using the conventional methods of CVD taught by Ikakura et al because modifying the film forming surface reduces roughness and prepares the film surface for deposition. Modifying the film-forming surface with ammonia and hydrogen peroxide promotes adhesion of insulating layers in order to enable the oxide formation step of Ikakura et al. to be performed.

Ikakura et al. is silent on the use of H2O2 when modifying the film-forming surface. It was well known at the time of the invention to remove dangling bonds of an interface by bringing ammonia and H2O2 into contact with the film-forming surface (Kohei, abstract). Removing the dangling bonds of the film-forming surface with ammonia and H2O2 removes hydroxyl groups that cause condensation at the interface.

In re claim 5, Ikakura et al. teaches using an amino compound with the chemical formula RNH2 (abstract, ¶¶ 1-12, 36, claim 7).

In re claim 7, it would be obvious to one skilled in the art to expose a silicon nitride film to hydrogen peroxide for the advantages taught by Kohei's cleaning step (¶ 24) which removes dangling bonds and reduce hydroxyl groups in order to prevent peeling and blistering, and improve adhesion

In re claim 10, Ikakura et al. teaches that HNO3 is added to the aqueous solution (¶36).

In re claim 11, Ikakura et al. teaches preparing a mixed solution of NH3, H2O2, and H20; heat insulating the mixed solution at a predetermined temperature for a predetermined time so that $NO2^-$ and NO_3^- concentrations in the mixed solution are set to a desired concentration, exposing a film forming surface of SiO2 to the mixed solution after heat insulating and forming an insulating film on the film forming surface after the film forming surface is exposed to the mixed solution (fig. 3, ¶¶ 23-25, 58-66, claims 1-3, 8).

In re claims 12-15, Ikakura et al. teaches that the insulating film is silicon containing and formed by thermal CVD using O3 and TEOS (abstract, claim 9, fig. 3, ¶ 64).

Kohei teaches that the wafer surface is changed to a hydrophobic state after cleaning the film-forming surface with NH3 and H2O2 prior to depositing a pure thermal oxide film in order to improve adhesion. Ikakura et al. teaches the well-known method depositing an insulating layer with CVD using TEOS and O3 after cleaning the film-forming surface. In order to obtain a defect free film forming surface, it would be obvious to one skilled in the art to combine the methods taught by Kohei with Ikakura et al. because both methods remove dangling bonds on the film forming surface prior to deposition of Silicon oxide deposition.

Conclusion

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0957. See MPEP 203.08.

Any inquiry concerning this communication from the examiner should be directed to Lisa Kilday whose telephone number is (703) 306-5728. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry,

can be reached on (703) 308-1680. The fax number for the group is (703) 305-3432. MPEP 502.01 contains instructions regarding procedures used in submitting responses by facsimile transmission.

Lisa Kilday

LAK

4/21/02

4-21-02

MICHAEL SHERRY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800